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STUDIES IN THE AGARICS OF DENMARK

PART XI

PSATHYRA, PANÆOLUS, PSILOCYBE,
GOMPHIDIUS, PHYLLOPORUS, CANTHARELLUS,
SCHIZOPHYLLUM.

BY

JAKOB E. LANGE

KØBENHAVN
H. HAGERUPS BOGHANDEL
BIANCO LUNOS BOGTRYKKERI A/S
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Studies in the Agarics of Denmark.

Part XI.

Psathyra, Panæolus, Psilocybe, Gomphidius, Phylloporus, Cantharellus, Schizophyllum.

By

Jakob E. Lange.

THE GENUS PSATHYRA
(sensu ext.).

The genus Psathyra as here conceived is made to include *Psathyrella*, but not *Coprinellus*, and can be briefly defined as follows:

Cap submembranaceous, edge not incurved, often pellucido-striate but not fisso-sulcate, naked or covered by an evanescent, fibrillose veil. Stem slender, often brittle, more or less fistulose. Spore-powder generally purplish-bistre to almost black. Spores ovate to ellipsoid (not limoniform).

It is hardly defensible to maintain the Friesian genus *Psathyrella* which he distinguishes from Psathyra by means of its blackish spore-print. The colour of the spore-powder in such intimately related — if not identic — species as *Psathyra conopilea* and *Psathyrella subatrata* is hardly different. And some of the velate species (which Fries without exception places in Psathyra) have just as blackish spore-powder as any of the Friesian Psathyrellas. — Still I deem it convenient to uphold *Psathyrella* as a subgenus, embracing all the species which not only have a naked cap and blackish spores but also large spores, reserving the subgenus *Eu-Psathyra* for the small-spored species.

The velate species, which Fries arranged in a series *Fibrillosi*, Karsten some years later segregated into a distinct genus, *Pannucia* (reduced again in his "*Kritisk Øfversigt*" (1889) to a subgenus). I follow him in using the name as a subgeneric one only. It is true that the line of demarcation between the velate and the naked species is not at all a distinct one — no natural boundary-lines ever are —. Many of the apparently naked species will be found — when examined before the opening up of the cap — to have some few minute, silky fibrils connecting the edge with the stem. And in a few cases it will depend on a mere estimate whether such rudiments shall be taken into account or not. But if other affinities be also duly regarded, these critical species can as a rule be fairly satisfactorily placed in the vicinity of either distinctly velate or absolutely naked species.

Some few species, which are here placed within *Pannucia*, have no universal veil coating the cap with fibrils, but only a marginal appendiculation of a partial veil which before the opening up of the bud is extended between cap and stem (after the manner of *Hypholoma Candolleanum*). They also show affinities with *Hypholoma* in other respects, but their large, almost black spores, their small cap and slender stem are distinctly Psathyroid.

To the genus *Psathyrella* Fries also referred *P. disseminata*, *P. impatiens* et al. which have a somewhat Coprinoid character, owing to their fisso-sulcate cap. They also have other traits in common with certain species of *Coprinus* (e. g. *C. ephemerus*), particularly the minute, erect setulæ which stick out between the parenchymatic cells of the epiderm. And the sterile cells (paraphyses) which are interpolated between the fertile basidia, give to the face of the gills an almost coprinoid character, although the paraphyses are generally smaller, more basidiiform than in Coprinus. Quélet for such reasons transferred these species to *Coprinus* (*Coprinellus*), (called "Aftertintlinge" by Ricken). And in "Studies II" I followed these authors in this taxonomy. Presumably it will be the most satisfactory arrangement to single them out in a separate genus *Coprinellus*, distinguished from the true Coprini chiefly by the non-diffluent gills (no "auto-digestion") and consequently non-recurving cap.

The microscopic characteristics of the genus *Psathyra*, as here conceived, are rather uniform. The spores are ellipsoid or ovate, sometimes slightly phaseoliform, but never limoniform (as

in *Panæolus* and certain *Coprini*). The size varies about 1 : 2, averaging about 7 μ long in the small-spored species, and reaching 14 μ in the most large-spored ones. The smaller spores are generally rather diaphanous, light brown, the larger ones more or less opaque, dark bistre. The basidia are inflated bludgeon-shaped or inversely flask-shaped with 4 sterigmata. Only in a little form, which probably hsould be called *P. prona*, I have generally observed 2-spored basidia. — The cystidia — which always are present on the edge of the gills — are rather uniform, varying from lanceolate-hair-shaped to somewhat inflated bottle-shaped. In a few cases vesiculose, balloon-shaped or obovate cystidia are met with.

The epiderm of the cap is generally made up of almost isodiametric, polygonous to globular cells. They swell as the cap expands, and in some cases they become comparatively large and prominent, giving to the dry cap an almost micaceous or atomate appearance; but the cuticle is never strewn with glittering, loose particles as in *Coprinus micaceus* etc. — In numerous finds of *Psatyrella subatrata* I have observed long, brown setulæ implanted — very dispersedly — among the cells of the epiderm.

Nearly all the Psathyras grow on the ground, but in many cases it will be seen that the mycelium is attached to rotten sticks, chips etc. buried in the substrate. (In such cases the stem has a shorter or longer "tap-root"). Some species are preferably to be met with on rubbish-heaps, among rotten straw and other refuse; but only a single species seems to be truly coprophilous: the form which I call *P. semivestita* var. *coprobia*, but which may be a distinct species. A good many species are to be met with in clearings in frondose copses; only a single species (*P. fibrillosa*) seems to prefer mossy places in coniferous plantations.

KEY

TO THE SPECIES OF THE GENUS PSATHYRA FIGURED IN "DANMARKS AGARICACEER".

A. **Pannucia.**

Veil evident, either marginal (velum partiale) or partly covering the young cap (velum universale), from edge in, in the form of fugacious, minute fibrils, squamules or flocci.

α Spores large (over 10 μ long).

1. Partial veil appendiculate, fugacious, forming white denticles at the edge of the young cap. Surface of cap naked, almost white.
   a. Cap semiglobate, edge striate. Stem slender. . 1. *P. fragilissima.*
   b. Cap somewhat conical.
      * Stem rather short. Cap smooth, comparatively fleshy 2. *P. lactea.*
      ** Stem slender, Cap minutely striate, membranaceous 2a. *P. l. var. virginea.*
2. Cap wholly or partially covered by fugacious fibrils or minute down.
   a. Gills very broad. Cap convex subglobose. On dung 3. *P. semivestita var. coprobia.*
   b. Gills rather narrow. Cap somewhat conical.
      * Spores 9—10 μ .... 4. *P. Gordonii var. minor.*
      ** Spores a little longer ($10^1/_2$—12 μ) .... 4a. *P. Gordonii var.*(?).

β Spores rather short (9 μ or less).

1. Solitary or subfasciculate.
   a. Cap dark fuscous when wet. Gills broadly plano-adnate.
      * Short and comparatively stout. Edge of cap white-appendiculate .... 5. *P. gossypina.*
      ** Slender and brittle. Cap fibrillose .... 6. *P. fibrillosa.*
   b. Cap paler or with rounded-adnate gills.
      * Young cap whitish, downy-flocculose all over .. 7. *P. pennata.*
      ** Cap hygrophanous, not flocculose all over.
         † Cap fuscous-bistre. Spore-print purplish sepia 8. *P. nolitangere.*
         †† Cap dusky cinnamon. Spore-print brownish fuscous 9. *P. frustulenta.*
2. Densely fasciculate. Cap very small, with fugacious, minute squamules on disc. .... 10. *P. consimilis.*

B. **Eu-Psathyra.**

Spores small (less than 10 μ long). Edge of cap naked or only with very minute and very fugacious, rudimentary fibrils at the edge.

α Somewhat fasciculate species.
1. Densely stipate (30—70 fruit-bodies together). Stem slender 11. *P. stipatissima.*
2. Subfasciculate, more stoutish .... 12. *P. fatua.*

β Subsolitary species.
1. Large species (expanded cap 4 cm. or more).
   a. Cap subglobate-convex, dark fuscous when wet. Spores 9—10 μ long. .... 13. *P. fusca.*
   b. Cap subumbonate, dirt-brownish, becoming whitish. Spores 7—8 μ long. .... 14. *P. spadiceogrisea.*
2. Smaller species. Cap rarely over 3 cm. broad.
   a. Young cap slightly fibrillose on the edge. No balloon-shaped cystidia .... 15. *P. subnuda.*
   (Cap dusky cinnamon. Spore-print brownish-fuscous: Vide *P. frustulenta*).
   b. Young cap naked. Cystidia on edge partly balloon-shaped.
   * Stem straight. Gills brownish flesh-colour at first. 16. *P. obtusata.*
   ** Stem somewhat wavy. Gills fuscous .... 17. *P. gyroflexa.*

C. **Psathyrella.**

Spores long (over 10 μ). Cap naked or almost so.

α Subfasciculate, rather large .... 18. *P. caudata.*

β Not fasciculate.
1. Rather tall and large (cap 3 cm. or more). Gills slightly adnate; their edge not pink.
   a. Cap pallid, without striæ, not hygrophanous.. 19. *P. conopilea.*
   b. Cap fuscous, striate, hygrophanous ..... 19a. *P. c. var. subatrata.*
2. Somewhat smaller. Gills broadly adnate.
   a. Medium. Stem somewhat rooting.
   * Edge of cap perfectly naked. Cap generally pale (or rosy).
   † Campanulate; surface even .... 20. *P. gracilis.*
   †† Umbonate, expanded; surface wrinkled. 20a. *P. g. var. corrugis.*
   ** Edge slightly fibrillose when young. Cap darker, fuscous date-brown .... 21. *P. squamifera.*
   b. Small, not rooting.
   * Gills moderately broad, somewhat ascendent.
   † Cap dark fuscous, pellucido-striate .. 22. *P. trepida f. minor.*
   †† Cap paler (often pinkish when dry). Basidia generally 2-spored 23. *P. prona.*
   ** Gills very broad, plano-adnate.
   † Cap alutaceous to pale tan. Stem not pellucid 23. *P. subatomata.*
   †† Cap pale gray, micaceous. Stem subpellucid.. 24. *P. atomata.*

SYSTEMATIC AND FLORISTIC NOTES.

A. PANNUSIA

1. **P. fragilissima** J. E. Lange.

Rather large and tall. Cap 2—3 cm. (exceptionally up to $4^1/_2$ cm.), semiglobate-convex, submembranaceous, hygrophanous, of a watery pale, fuscous colour and minutely striate half way in when wet; whitish and even when dry. Edge appendiculate with a membraneous, white veil, which at first is cottony but soon breaks up into small denticles. Gills rather crowded, brownish grey, slightly adfixed, with a white edge. Stem straight and tall (8—10 cm.), rather slender (about 3 mm.), hollow, very brittle, white (also inside), at first slightly downy but soon glabrous and glossy.

Spores $12 \times 6\,\mu$, ovate-ellipsoid, sub micr. blackish-brown, almost impellucid. Cystidia short and broad, vesiculose-flask shaped, with a short, thick neck, about $12\,\mu$ broad.

Fig. spec. (D. A. pl. 712)*): Hjallese, growing dispersed on a heap of decaying garden-weeds in a copse, Oct. 1901 (and later years). Also met with at "Juelsberg", Aug. 1934.

The larger spores and the slender stem distinguish this specise from small forms of the *Hypholoma Candolleanum* stirpe. *Psathyra torpens* Fr. (as described and figured by Fries) is very much like my plant but said to be absolutely devoid of a veil.

2. **P. lactea** J. E. Lange.

Medium to rather small. Cap $1^1/_2$—2 cm., somewhat conically convex, even, alutaceous-white, not hygrophanous, somewhat fleshy with a white, membranaceous, fugacious veil, which is appendiculate in the form of minute marginal teeth. Gills rather narrow, attenuato-adnate, rather crowded, at first slightly tinged with pale fleshcolour, then bistre. Stem rather short and stout (3—4 cm. × 2 mm.), hollow, glabrous, white, somewhat brittle.

Spores 12—13 × 6—7 μ, ellipsoid-oval. Cystidia vesiculose-

*) The numbers refer to the water-colour portraits of *Danmarks Agaricaceer*, a collection which now numbers about 1100 species or distinct varieties, painted by the author 1893—1935. The collection is in the Botanical Museum. Copenhagen.

flaskshaped with a short, broad neck, 10—12 μ broad (neck about 7 μ).

Fig. spec. (D. A. pl. 709): "Fruens Böge", in a dry road-ditch, gregarious, July 1900. — Also met with in several other places till early in October.

Like the preceding species it forms a transition to *Hypholoma*, especially *H. egenulum:* but it is smaller, with larger spores and of a more Psathyroid appearance than this species. If it were not for the distinct velum and the rather brittle stem it might be referred to *Psilocybe callosa* in the sense of Fries. But this species is so hopelessly confused that it seems to be almost impossible to disentangle the knot.

2a **P. lactea** forma *virginea.*

Generally more slender, the cap more parabolic-conical (about 1.4 cm. high and 2 cm. broad), with a wartlike umbo, almost pure milk-white, edge slightly striate. The gills are pure white at first, slowly becoming nebulose-grayish, very narrow and almost free. Stem smooth, 6—9 cm. × 2$^1/_2$—3 mm. Almost sterile. For the rest like the main form.

Spores (very few) ellipsoid, 13—15 × 6 μ, sub micr. dark brown. Cystidia cylindric flask-shaped, obtuse, about 30 × 10 μ (apex 7 μ).

Fig. spec. (D. A. suppl. after pl. 718): Tune, in grass, roadside in park, Oct. 1924 (a few specimens). Also at Ubberup, rubbish-heap in garden, Sept. 1928.

Intermediate forms in the Ubberup-collection, some of which were fully fertile, show its close affinity to no. 2. But the extreme form is very distinct.

3. **P. semivestita** B. & Br. var. *coprobia* J. E. Lange.

Rather small. Cap 1—2$^1/_2$ cm., very brittle, submembranaceous, subglobular, becoming convex, hygrophanous, brownish-fuscous, the edge minutely striate when wet and remaining dusky brown for a time, while the rest of the cap dries alutaceous or pale clay. The surface of the young cap is set, half way in, with white, fugacious flocci, and the edge is fibrillose-fimbriate. Gills very broad, triangular, horizontally adnate, rather crowded, brownish-fuscous. Stem white, rather short (3—5 cm × 2 mm.), hollow, brittle, at first white-flocculose, then smooth. Spore-print almost black.

Spores 10—12 × 5$^1/_2$—6 μ, oval-ellipsoid, slightly pellucid blackish-bistre. Cystidia flask-shaped with a rather long, narrow, obtuse neck (8—10 μ broad, neck about 3 μ).

Fig. spec. (D. A. pl. 715): Hjallese, on cow- and horse-dung in a green field, Oct. 1902. Also met with in other localities 1914—1926, sometimes on dung in forest-drives.

Kauffman (loc. cit. page 271) also describes a coprobious form of P. semivestita. His plant has a more rufous-umber, ovate-

campanulate cap; but for the rest his description squares very well with mine, and the two may be identical. The coprobious form may deserve specific rank, but as I have never met with the terrestrial form, I have not had the opportunity to make a critical comparison.

4. **P. Gordonii** B. & Br. forma *minor.*

Rather small. Cap $1^1/_2$—2 cm., conic-convex, with a small, rather prominent umbo, whitish, coarsely grooved, thinly covered up to the umbo by silky-flocculose fibrils. Gills lanceolate, narrowly adnate, dirt-brown. Stem 4—6 cm. × 2 mm., somewhat wavy, white, downy fibrillose at first.

Spores 9—10 × 5—$5^1/_2$ ovate. Cystidia bottle-shaped, with a shorter or longer neck, about 25—33 × 12 μ.

Fig. spec. (D. A. pl. 718): Rynkeby, gregarious on a ditch-bank, under old Populus, Oct. 1899.

Cooke's figure (Pl. 580) is somewhat larger and not so distinctly grooved as my plant. My finds differ from the current descriptions by not being fasciculate. And I have not noticed the faint nauceous smell it is said to possess.

4a. **P. Gordonii** var. (?).

Medium. Cap $1^1/_2$—$2^1/_2$ cm., parabolic-campanulate, then somewhat expanding, with a small umbo, submembranaceous, brittle, without striation, of a pale dirt-grayish colour (whitish when dry), at first, up to the umbo, clad with whitish fibrils which towards the edge form minute squamules extending over the edge to the stem. Gills narrow, rather crowded, adnate, at first pale dirt-gray, then more grayish-brown (edge pale). Stem slender (7—9 cm. × 2 mm.), hollow and very brittle, somewhat wavy and at first minutely fibrillose and corrugated.

Spores 12—$12^1/_2$ × $5^1/_2$ μ, elongated ellipsoid (in other finds 11 × $5^1/_2$ or $10^1/_2$—$11^1/_2$ × $5^1/_2$—$5^3/_4$ μ). Cystidia obtusely bottle-shaped with a rather thick, short or somewhat elongated neck (25—33 × 12—13 μ).

Fig. spec. (D. A. pl. 717): Hjallese, gregarious in grass (with remnants of horse-dung), edge of road, Aug. 1913.

This form is very close to the preceding one, from which it chiefly differs in the ungrooved cap, the taller stem and the somewhat longer spores. But it hardly deserves specific rank.

5. **P. gossypina** (Bull.) (?).

Medium, but short. Cap 2—$3^1/_2$ cm., campanulate, then expanded, hygrophanous, fuscous-umber (alutaceous with a flush of purplish when dry), somewhat fleshy, without striation, but coarsely grooved when dry. The edge of the young cap is (about $^1/_3$ up) set with fugacious white fibrils and marginal white denticles. Gills

broadly adnate, brownish fuscous, edge white. Stem short (3—4 cm. × 3 mm.) — densely white-downy fibrillose, brownish inside, like the flesh of the cap. Spore-print blackish bistre.

Spores ovate or slightly phaseoliform, $8^1/_2$—$9^1/_2 \times 4^1/_2$ μ. Cystidia somewhat bottle-shaped with a shorter or longer neck, 8—12 μ broad.

Fig. spec. (D. A. pl. 716): Sorö, open space in wood of Fagus about a sawmill, gregarious, Oct. 1901.

This form is very close to *Hypholoma artemisiæ* and probably not specifically distinct from it. But there is no ring-like zone on the stem, and the edge of the cap is not visibly incurved. The fibrils on the cap only cover the outer third, like in P. semivestita, from which species it is separated i. a. by the smaller spores.

6. **P. fibrillosa** (Pers.).

Medium. Cap 2—$3^1/_2$ cm., campanulate-convex, then plano-convex, slightly umbonate, hygrophanous, striate about half way in, watery brownish-gray, umbo more brownish, towards the edge set with loose, fugacious, white fibrils. Gills broad and broadly adnate, dark fuscous (when young slightly bluish), rather distant. Stem tall, very brittle, hollow, about 8 cm., white, loosely floccoso-fibrillose, apex slightly mealy-plumulose. Spore-print dark bistre to sepia.

Spores oval, 8—9 × $4^1/_2$ μ, dark brown. Cystidia on edge somewhat bottle-shaped, with a shorter or longer neck, 10—12 μ broad. The face of the gills is sparingly set with roundish, about 12 μ broad cystidia.

Fig. spec. (D. A. pl. 714): "Haare Bjerge", amongst Calluna and Hypna in plantation of Picea, Oct. 1914. Not rare, in similar localities, late in the season.

7. **P. pennata** Fries.

Rather small. Cap $1^1/_2$—2 cm., conic-campanulate, slightly umbonate when expanding, whitish, densely clad all over with a fibrillose, white scailness, not hygrophanous. Gills rather narrow and slightly adnate, pale fuscous with a flush of flesh-colour. Stem rather short (5 cm.), comparatively stout (2—$2^1/_2$ mm.), white (inside and outside), densely white-flocculose.

Spores ovate-ellipsoid, 8—$9^1/_2 \times 4^1/_2$ μ. Cystidia flask-shaped, with a shorter or longer neck, about 10—13 μ broad.

Fig. spec. (D. A. pl. 719): Hjallese, subsolitary in frondose wood, in moist places, Sept. 1898. Rather rare.

Cooke's figures (pl. 580) are mostly larger and more Hypholomoid than my plant, Bresadola's (*Iconographia* pl. 872) is too naked.

8. **P. nolitangere** Fr. (sensu Ricken).

Rather small. Cap (when fully expanded) 1.7—3 cm., at first ovate, then plano-convex, distinctly umbonate, hygrophanous, dark

date-brown, rather coarsely striate half way in (when dry clay-brownish, slightly wrinkled); edge at first (about $^1/_4$ in) with minute white fibrils. Gills rather broad, rotundato-adfixed, somewhat distant, at first pallid clay, then brownish-gray, becoming fuscous; edge pale, but not white. Stem hollow, brittle, rather short, 4 cm. × 2—$2^1/_2$ mm., apex mealy, towards the base adpressedly silky-fibrillose, whitish above, dusky below, especially when the fibrils disappear.

Spores $8^1/_2$—$9^1/_2$ × 5, oval-ellipsoid, sub micr. date-brown, pellucid. Basidia 4-spored. Cystidia bottle-shaped with a short, obtuse, rather thick neck, 25—30 × 9—11 μ (neck about 5 μ).

Fig. spec. (D. A. suppl. after 714): Elsehoved, gregarious on wet, blackish humus (with Juncus bufonius etc.) on drive in wood, somewhat boggy ground (Betula, Alnus, Pinus), Jan. 1929.

Differing from P. fibrillosa by the short, almost glabrous stem, the but slightly fibrillose cap, darker, more date-brown colour. The small form depicted by Fries (*Icones sel.*) has an almost black stem. It might be sought under Eu-Psathyra, as the fibrils on the edge are very fugacious and minute.

9. **P. frustulenta** Fr.

Rather small. Cap $1^1/_4$—2 cm., campanulate-convex, striate about half way in, submembranaceous, pale cinnamon-brownish to café-au-lait, clad about half way up with very fugacious, minute fibrils, (alutaceous when dry). Gills rather broad, adnate, very pale brownish, not crowded. Stem about 5 cm., white, fibrillose. Spore-print subfuscous dirt-brown.

Spores ovate-oval, 7 × $4^1/_4$ μ. Gill-edge rather sparingly set with bottle-shaped, 8—9 μ broad cystidia.

Fig. spec. (D. A. pl. 720): Hjallese, open clearing in copse, Oct. 1898. Not uncommon, but generally solitary, often attached to half-buried sticks and twigs.

The pallid brownish colour gives it a somewhat Galeroid appearance. When the fibrils disappear it will be sought under B. — Bresadola's figures (*Iconographia* pl. 866[2]) are too gigantic, much larger than given in his own description.

10. **P. consimilis** Bres.

Small, densely fasciculate. Cap 1—$1^1/_2$ cm., campanulate-convex or somewhat conic, whitish-pale at first, becoming subfuscous and minutely striate $^2/_3$ up. The disc is at first sparingly set with minute, deciduous, recurved scales. Gills lanceolate, slightly adnexed, dingy pale flesh-colour at first, becoming somewhat fuscous. Stem white, wavy, slightly powdered, subpellucid, about 3—5 cm. × 1 mm. Spore-print fuscous umber.

Spores oval-phaseoliform, 7 × $3^3/_4$ μ (in other finds pale date-brown, 6 × $3^1/_2$ μ). Cystidia oval, about 10 μ broad, or somewhat

bottle-shaped, up to 12 μ broad. Basidia 4-spored. Squamules on cap made up of somewhat irregular-roundish, slightly yellowish cells.

Fig. spec. (D. A. pl. 722): Trolleborg, densely caespitose in great numbers on very rotten stumps of Populus, July 1898 (and in several other similar places in Fyn, Sjælland and Jylland 1900—1930, often in company with *Coprinellus disseminatus)*.

Differing from *C. disseminatus*, in the more conic-expanded cap with fugacious squamules and minute striation, while in *C. d.* the cap is sulcato-striate, obtusely campanulate, set with minute, erect setulæ. — Cooke's figure of *P. prona* (Pl. 656, upper figure) may depict *P. consimilis*.

B. EU-PSATHYRA

11. **P. stipatissima** J. E. Lange.

Medium, densely stipate. Cap $1^1/_2$—2 cm., conic-convex, pale dingy tan, umbo clay-brownish, edge minutely striate half way up. Gills rather crowded, rotundato-adnate, moderately broad, dirtbrown with a slight flush of purplish. Stem slender (7—9 cm. $\times$ 2 mm.), whitish, fistulose. Up to 60 individuals springing from subterraneous, vertical, central strunk.

Spores oval, $6^1/_2 \times 3^1/_2$ μ, date-brown, pellucid. Cystidia hair-shaped, basal part somewhat inflated (after the manner of Urtica-hairs), 45—50 $\times$ 8—9 μ. Cells of epiderm isodiametric-polygonate, 15—20 μ diam.

Fig. spec. (D. A. pl. 708): Aaløkkeskov, under trees and in adjoining open grassy borders, Sept. 1905. Also found in a number of similar localities 1905—1934.

The densely stipate growth distinguish this species from all other *Psathyras* which individually bear some likeness to it.

12. **P. fatua** Fr. (sensu Bres.).

Rather large, somewhat fasciculate. Cap $2^1/_2$—4 cm., rather fleshy, hygrophanous, acorn-shaped while in bud, with evanescent, arachnoid fibrils on the edge, date-brown; when fully expanded somewhat paler, clay-brownish to livid grayish (very pale ochraceous clay when dry), subumbonate, expanded-conical, without striation. Gills moderately broad, adfixed, not crowded, whitish, then subfuscous to dingy chocolate, edge whitish. Stem rather short, hollow, white, minutely striate (apex slightly powdery), 5 cm. $\times$ 4 mm.

Spores narrow and somewhat obliquely ellipsoid, $8^1/_2$—$9 \times 4^1/_2$—$4^3/_4$ μ, dark date-brown. Cystidia obtuse, inflated fusiform (or somewhat bottle-shaped with a broad neck), 45—50 $\times$ 12—16 μ.

Fig. spec. (D. A. pl. 710): Tarup near Odense, edge of road, somewhat fasciculate (3—10 fructifications united). Rare.

Rea's *P. fatua* does not seem to be identical; and even Fries' own

description leaves me somewhat doubtful. The fibrillosity on the edge of the cap is so rudimentary that I prefer to place it in *Eu-Psathyra* instead of in *Pannucia*. Larger specimens bear some likeness to *Hypholoma Candolleanum*, but it has no trace of an appendiculate, membraneous veil. — *P. fatua* in the sense of Sev. Petersen has large spores and cannot belong here.

13. **P. fusca** (Schum.).

Large, solitary. Cap 3—$5^1/_2$ cm., semiglobate-convex, somewhat fleshy, dark fuscous, edge striate (and at first with arachnoid, evanescent white fibrils), even and pale clay when dry. Gills rather broad and broadly adnate, at first pale grayish brown, then darker fuscous with a slight violaceous tinge, not distinctly edged with white. Stem rather straight and firm, white, 7—8 cm. × 7 mm. Spore-print almost black.

Spores oval, 9—10 × 5 μ. Cystidia of various shape, inflated, often somewhat bottle-shaped with a short neck, about 14 μ broad.

Fig. spec. (D. A. pl. 711): Lammehave, on humus, fallen sticks and buried branches in wood of Fagus, Sept. 1899. Not uncommon in similar localities.

Although this species is rather common in beechwoods, I have sought in vain in modern mycological literature for an adequate description. But I have no doubt that it is the plant described by Schumacher as *Agaricus fuscus*, which Fries regards as a large form of *P. obtusus*, but which evidently is a distinct species.

14. **P. spadiceogrisea** (Schaeff.).

Large, solitary or in twos or threes. Cap 3—5 cm., at first somewhat conical, then expanded and subumbonate, hygrophanous, somewhat fleshy. When saturated the cap is brownish-fuscous, minutely striate about half way in, when dry the colour is pallid alutaceous. Gills rounded-adnate, moderately broad, at first whitish pale, then gray and at last fuscous, with a violaceous tinge and a white edge. Stem rather tall, white, 7—12 cm. × 4—7 mm., smooth.

Spores ovate-oval, $7^1/_2 \times 4^1/_2$—$4^3/_4$ μ. Cystidia obovate-vesiculose, 10—18 μ broad.

Fig. spec. (D. A. pl. 707): Hjallese, about rotten stumps in frondose copse, May 1898 (and later years). Not uncommon. Seems to be decidedly vernal, while no. 13 is autumnal.

Rea's description is almost like mine, except for the dimensions given for the spores (8—11 × 4—6 μ). Bresadola's figures and descriptions (*Iconographia*) are good. He also notes its vernal nature. Ricken's figure is rather misleading.

15. **P. subnuda** Karst.

Rather large. Cap 2—3 cm., at first broadly parabolical, then convex, when young pale date-brown, (apex with a tinge of fulvous),

then pale tan, edge somewhat fuscous from the minute striation that reaches about $^1/_3$ up. When dry the cap is alutaceous and somewhat micaceous. While in bud the cap has a covering of minute, silky fibrils on the edge which generally disappear before the cap opens. Gills rather broad, adnate, violaceous-fuscous, edge white. The stem is straight, rather tall (7—9 cm. × 3—4 mm.), fistulose, white, glabrous (apex slightly powdered). Spore-print blackish with a flush of purple.

Spores ovate (or sublimoniform), 8—9 × 5—5$^1/_2$ μ, dark brown. Cystidia short-necked, bottle-shaped, about 12 μ broad, obtuse.

Fig. spec. (D. A. pl. 713): Langesø, gregarious in moss and grass, drive in frondose wood, Oct. 1913. — Rather rare.

It is not unlike *P. conopilea*, but more obtuse and with much smaller spores. Schroeter's P. conopilea (with small spores) may be this species.

16. **P. obtusata** Fr.

Medium. Cap 1$^1/_2$—2$^1/_2$ cm., broadly parabolic, then subconic-convex, brittle, tan date-brown while in bud, becoming more dingy and striate half or $^2/_3$ way in with minute fuscous striae (paler tan to whitish when dry, surface somewhat wrinkled), very hygrophanous. Gills not crowded, rather broad and broadly adnexed, whitish-pale at first, then watery chocolate or lilac-brownish, at last somewhat darker fuscous. Stem 6—7 cm. × 2$^1/_2$ mm., hollow, shining white, with a somewhat wavy surface, apex slightly powdered. Spore-print dark brownish gray, with a lilaceous-purplish flush.

Spores ovate or subphaseoliform, 7$^1/_4$—7$^3/_4$ × 4$^3/_4$ μ, translucid, light brown. Cystidia numerous, vesiculose balloon-shaped, 25 × 17 μ large ones and a number of bottle-shaped, narrower ones with a short, obtuse neck, 30 × 12 μ.

Fig. spec. (D. A. suppl. after 728): Husmandsskolen, Odense, in a copse (chiefly Quercus, Corylus) on the ground among (or on) rotten sticks, gregarious, Sept. 1925. — Not rare.

Cooke's figure (pl. 593) is fairly good; he also depicts the small spores. Rickens *P. oblusata* does not belong here.

17. **P. gyroflexa** Fr.

Small. Cap about 1$^1/_2$ cm., broadly parabolic or somewhat conic, fuscous, striate $^2/_3$ up, membranaceous. Gills rather broad, adfixed, purplish-fuscous. Stem wavy, thin, about 6 cm. × 1$^1/_2$ mm., white, brittle. Spore-print brownish sepia.

Spores oval-phaseoliform, 7$^1/_2$—8 × 4$^1/_2$ μ. Cystidia: numerous balloon-shaped ones, 25 × 20 μ, and a few short-necked bottle-shaped ones, 30 × 12 μ.

Fig. spec. (D. A. pl. 721): Hjallese, solitary in grass, outskirts of copse, July 1898.

Very close to the preceding species, perhaps only a small and slender form of it, but answering so well to the Friesian description that I attach the name *P. g.* to it.

C. PSATHYRELLA

18. **P. caudata** Fr.

Large, subfasciculate. Cap 2—5 cm., at first parabolic-campanulate, then obtusely conical with irregularly upturned edge. Colour at first date-brown (slightly fulvous), becoming pale tan or whitish-ochre clay, somewhat grooved or plicate. Gills rather narrow, pale, becoming dark gray, adnate, rather crowded, edge whitish. Stem straight or somewhat twisted, thin (2—4 mm.), rather tall (6—8 cm.), whitish, somewhat dingy below, not distinctly hollow, base slightly fibrillose, elongated into a conical tap-root.

Spores $11^1/_2$—$13 \times 5^3/_4$—$6\ \mu$, oval-subphaseoliform, impellucid, bistre. Cystidia of various shapes: short and obtuse or elongated, acute (subfusiform to bottle-shaped), up to 40×7—$8\ \mu$. Epiderm made up of roundish cells, 25—50 μ in diameter. Basidia 9—10 μ broad.

Fig. spec. (D. A. suppl. after pl. 722): Odense, growing subfasciculate at the base of an oaken fence-pole. Nov. 1934.

19. **P. conopilea** Fr.

Large or rather large. Cap $1^1/_2$—4 cm. broad, conic-campanulate, hardly hygrophanous and without striation, of a dingy alutaceous colour, clay-whitish when dry, of a somewhat micaceous appearance. Gills moderately broad, ascendent and affixed, at first grayish brown then bistre with a purplish tinge. Stem very tall and straight (10—15 cm. $\times\ 2^1/_2$—$3^1/_2$ mm.), white, glabrous, hollow. Spore, powder almost black, slightly bistre.

Spores oval, $12^1/_2$—$16 \times 7^1/_2$—$8\ \mu$. Cystidia cylindric-bottle-shaped, obtuse. Epiderm made up of globular cells, 18—40 μ in diam.

Fig. spec. (D. A. pl. 724): Trolleborg, roadside, drive through an open space in wood of Fagus, Sept. 1897. — Not uncommon.

19a. **P. c.** var. *subatrata* (Batsch).

Almost the only difference between this form and no. 19 is that the cap is very hygrophanous, being rather dark fuscous and striate ($^1/_3$ up) when saturated, while it is whitish-pale like the main form when dry (the unexpanded young cap is somewhat fulvous). The spores and cystidia are identical (cystidia 20—$45 \times$ 10—13 μ, obtuse). The epiderm is made up of subspheric, 20—30 μ broad cells, but between these a few long, borstlike, yellowish-fulvous, thick-walled, 150—300 μ long, about 4 μ broad hairs stick out.

Fig. spec. (D. A. pl. 723): Hjallese, amongst grass in a ditch outside a wood, gregarious, Sept. 1901. Not uncommon.

It remains to be seen if the brown, setulose hairs — which, even if very scanty, I have never found entirely absent — are also to be met with in the typical *P. conopilea.*

20. **P. gracilis** (Pers.).

Varying in size from rather large to quite small. Cap 1—3$^1/_2$ cm., at first parabolic, then convex, obtuse or slightly umbonate, striate half way in. The colour is very changeable: when young the cap is clay-brownish or even tan-fulvous, becoming pale tan when expanding; later on it attains a dingy livid or subfuscous colour — from edge in — due to the minute striation; and at last, in drying, it becomes alutaceous, often with a flush of pink. Gills broad and broadly adnate (edge generally somewhat pink), violaceous-fuscous. Stem straight, rather tall (6—10 cm. × 1$^1/_4$—3 mm.), smooth, almost pure white, with a short, fibrillous "tap-root".

Spores 12—13 × 6$^1/_2$ μ, ellipsoid. Cystidia subconical to almost subulate, about 40 × 9 μ.

Fig. spec. (D. A. pl. 725): Hjallese, open clearing in copse, gregarious, Sept. 1897. Common.

20a. **P. g.** forma *substerilis.*

The whole plant almost pure white (edge of gills pinkish). Spores almost 0; for the rest like the fertile form. Found in a roadside-ditch, Oct. 1899. Rather rare. — May be mistaken for a *Mycena.*

20b. **P. g.** var. *corrugis* (Pers.).

Rather large. Cap conic-campanulate, then plano-convex with a small, wartlike umbo, wrinkled all over, especially with age. Gills narrower than in the main form and narrowly adnate. For the rest not materially differing from the typical *P. gracilis.*

Spores 11—13 × 7 μ. Cystidia crowded, subconic-subulate as in the main form. Spore-print brownish black; individual spores dark van Dyke brown.

Fig. spec. (D. A. pl. 726): Ravnholt, in frondose wood, Oct. 1897. Rather rare.

Although the extreme form here depicted is fairly distinct, intermediate forms — of rather common occurrence — make its specific rank more than dubious.

21. **P. squamifera** Karst.

Medium to rather large. Cap 1$^1/_2$—3 cm., parabolic-campanulate, rather dark fuscous (never becoming pinkish), dirty whitish with age. The edge of the cap is (about $^1/_3$ in) sparingly set with fugacious, white, silky fibrils which at first extend to the stem, making it more or less fibrillose. The gill-edge is never pinkish. The stem

is not pure white, but slightly dirt-grayish below. The spore-print is almost black, with a slight violaceous tinge.

Spores ovate-ellipsoid, 11—$12^1/_2 \times 6$—$6^1/_2$ μ. Cystidia 8—13 μ broad, somewhat subulate.

Fig. spec. (D. A. pl. 727): Hjallese, in grass, boarder of road through wood of Corylus and Quercus, Sept. 1901. Not common, but generally gregarious.

It is very close to *P. gracilis* in every way, and may easily be mistaken for this species when the fibrils have disappeared. It may be sought for under *Pannucia*, but naturally belongs here, in the vicinity of P. gracilis. *P. microrhizus* in the sense of Cooke (not Fries) (*Illustrations* pl. 597 A) may belong here.

22. **P. trepida** Fr. forma *minor* Fr.

Small. Cap about $1^1/_2$ cm., convex campanulate, dark fuscous, striate $^1/_3$ in. Gills broad, adnate. Stem straight, rather slender, 7 cm. × $1^1/_2$ mm., becoming dingy from base upward, slightly rooting.

Spores oval-oblong, 12—14 × $5^1/_2$—$6^1/_4$ μ. Cystidia somewhat flask-shaped with a rather narrow neck (body 7—9 μ broad).

Fig. spec. (D. A. pl. 729): Vormark, on grassy common, Oct. 1898. Rare.

Very well figured and described by Fries (*Icones sel.* pl. 139[2]). The larger form mentioned by him I have never met. It is not very sharply distinguished from *P. gracilis.*

23. **P. prona** Fr.

Small. Cap 1—$1^3/_4$ cm., either somewhat conic — later convex and umbonate — or more obtuse, parabolic subcampanulate, subfuscous, striate $^2/_3$ up, when dry whitish, more or less flushed with pink. Gills moderately broad, attenuato-adnate, brownish-fuscous, edge often somewhat pinkish. Stem rather straight, glabrous, whitish, subdiaphanous, very brittle, not rooting.

Spores ellipsoid, 14—16 × $7^1/_4$—$7^3/_4$ μ (or $12^1/_2$—14 × $6^1/_2$ μ), almost impellucid. Cystidia 1) obovate-balloon-shaped, about 14 μ broad, 2) bottle-shaped, about 10 μ broad. Basidia 2-spored, about 10 μ broad. Epiderm somewhat micaceous from the subglobular, rather large cells of which it is made up.

Fig. spec. (D. A. pl. 728): Hjallese, on the ground, drive in copse, July 1914, and Hjallese, among rotten straw in stack-yard, very numerous, July 1916.

My plants were generally 2-spored; but I have met with forms with smaller and larger spores in the same specimen, probably from 4- and 2-spored basidia. Bresadola depicts it (*Iconographia* pl. 890[1]) with both 2- and 4-spored basidia.

24. **P. subatomata** J. E. Lange.

Small. Cap 0.8—1.5 cm., parabolic-convex, at first pale ochre-clay, then dingy whitish (almost white when dry), without striation

but while in bud sparingly set with very fugacious silky, fibrils. The dry cap is not distinctly micaceous as in *P. atomata.* Gills very broad and broadly adnate with a decurrent denticle, subdistant, fuscous with a slight tinge of purplish, edge whitish. Stem slightly pellucid, 4—5 cm. × $1^1/_2$ mm., whitish, smooth. Spore-print black.

Spores ellipsoid, 14—$15^1/_2$ × $7^1/_2$ μ, slightly diaphanous, bistre-black. Cystidia inflated flask-shaped with an almost balloon-shaped, 13—14 μ broad body and a shorter or longer, narrow neck.

Fig. spec. (D. A. pl. 730): Hjallese, gregarious on naked ground among rotten straw in stack-yard, June 1914. (Also on coast-common, Illumö, May 1926).

This little species is almost intermediate between *P. prona* and *P. atomata.* Its colours are like *P. Prona*'s when dry. The form of the gills and the want of striation it shares with *P. atomata.*

25. **P. atomata** Fr.

Small. Cap 0.8—2 cm., semiglobate-campanulate then campanulate-convex, hardly hygrophanous, of a pale ashy-gray colour, micaceous when dry and sometimes becoming flushed with pink. Larger specimens are sometimes coarsely grooved when old. Gills very broad and broadly adnate, almost triangular, pale to dark gray, rather distant. Stem thin, about $4^1/_2$—5 cm. × 1—$1^1/_2$ mm., white, almost pellucid, often somewhat wavy.

Spores oval or oblong-oval, 15—16 × 7—$7^1/_2$ μ (or 13 × 7 μ). Cystidia about 12 μ broad, somewhat bottle-shaped.

Fig. spec. (D. A. pl. 736): Hjallese, edge of road amongst grass, gregarious or solitary, July 1897. Common.

Very well characterised by the micaceous, ashy-gray, not pellucido-striate cap and the thin, subdiaphanous stem. — A substerile, almost white form is occasionally met.

Psathyrella (*Coprinellus*) *disseminata* and *P. impatiens* are described in »*Studies*« *II* (under *Coprinus*);

Sev. Petersen (loc. cit.) describes a few species not mentioned here: *P. staminoides* Karst., to judge from his description, is probably a *Coprinus*, very close to *C. cortinatus* Lange. *P. bifrons* Berk. I do not know. The finds which he mentions under my name belong to *P. fusca.* He also mentions — with some doubt — *P. fagicola.* This find possibly could be referred to *Psilocybe papyracea.*

The diagnoses given above are somewhat longer than those found in earlier parts of *Studies in the Agarics of Denmark.* But the

colours of cap and gills in these small species are so changeable, that the figures must needs be supplemented by descriptive notes.

It will also be seen that I have introduced a number of new names. Now new names in many cases are a nuisance and should be avoided whenever possible; but it is still worse, in order to avoid a new name, rashly to make use of an old one, the original description of which deviates considerably from the characters of the plant in question. There is every possibility that in so doing you "put the cat in the wrong bag" (made for another animal), thus making confusion worse confounded. —

THE GENUS PANÆOLUS.

The small genus Panæolus — as originally conceived by Fries — was a very well defined one, the boundary-lines towards the neighbouring genera being nearly everywhere distinct. But I make bold to include in the genus some few aberrant species which — although not being genuine *Panæoli* — each in its way show some affinity to the genus, while they are entirely distinct from *Psilocybe*, in which genus they were formerly included.

While the delimitation of the genus is comparatively easy it presents some internal taxonomical difficulties. Many of the species are so intimately related, their marks of distinction so vague that their claim to specific rank is a very weak one.

The true *Panæoli* can be briefly characterised as follows:

Cap parabolic to convex, rarely expanded, somewhat fleshy, with an incurved edge without a genuine veil. The gills are rather broad, ventricose, variegated while the ripening of the spores is going on, almost black when they are ripe. The stem is comparatively tall, straight, slender and tense, more or less saturated with the colour of the cap and often powdery at the apex. The spores are sublimoniform, large, 12 μ or more long.

The Friesian name *Panæolus* refers to the motley or variegated appearance of the gill-face, which is due to the fact that the ripening of the spores takes place not simultaneously all over the hymenium, but in fairly distinct areas which for this reason take on a darker hue, while the intermediate spaces still are more pallid, showing the original colour of the gill-substance a day or more longer than the more precose parts. — This characteristic is also to be seen in *Stropharia* (*Annellaria*) *separata*, which — if it were not for its distinctly annulate stem — might be retained in *Panæolus*, where it was placed by Fries.

Agaricus foenisecii shows the same characteristic but differs in having much paler and somewhat verrucose spores and fuscous,

not black, spore-powder. For this last reason it is generally placed in *Psilocybe*, although it shows no real affinity to any of the species within this heterogeneous genus, while the large, limoniform spores attach it to *Panæolus* (and separate it from *Psathyra*, to which genus it has also been referred).

Agaricus semilanceatus, the other aberrant species which I include in *Panæolus* (sensu ext.), differs mainly in the not distinctly variegated gills and not entirely black spore-powder. But for the rest it falls quite naturally within the pales of the genus.

Apart from these two atypical species the whole genus is very uniform. The only difference of marked importance and stability is the absence or presence of appendiculation: In some species (e. g. *P. retirugis*) the edge of the cap overreaches the gills a millimeter or more, thus forming a free, incurved marginal border which, when the cap expands, often splits up into appendiculate denticles and gradually disappears. In the rest of the species such appendiculation is entirely lacking, the edge therefore remaining absolutely entire. — The form of the cap is also fairly characteristic to most of the species, but not always so. *P. retirugis* f. inst. may have a subglobose cap like *P. papilionaceus*, or a campanulate one like *P. campanulatus*.

The nature of the epiderm is used as the chief characteristic by Fries. He distinguishes between a viscous, an opaque and watery, a dry and shining and a zonate series. Of the viscid species none are known to me, except *Agaricus separatus* which I place in *Stropharia*. To judge from the descriptions they are all very close to this species. *P. phalænarum* — at least as depicted by Bresadola (*Iconographia*), —is simply a pallid *A. separatus*, and Cooke's figure (*Illustrations*) may also be taken for this species. — The other three groups are not very well defined. It is true that the more outstanding, "ultra-typical" specimens well show the characteristics of their group: the dark marginal belt, the shining surface etc. — but intermediates are numerous. And the difference seems moreover partly to depend upon the age of the individual, the state of the weather and other irrelevant points.

The microscopical investigation does not add very much to our power of overcoming the taxonomic difficulties. The spores are almost uniform: the only difference worth mentioning — barring the verrucosity of the spores of *P. foenisecii* — is that some are very broad, limoniform-subglobose, while others are more

oval-limoniform. The spores also seem to vary a little in pellucidity and colour.

The basidia seem to be constantly 4-spored. Cystidia are present in all the species. BRESADOLA has observed fusoid, thick-walled, acute or somewhat crested, yellowish cystidia in *P. papilionaceus*, which he therefore singles out in a new genus: *Copelandia*. I have not verified his observation (in my specimens only the ordinary marginal hairs were observed); but I am inclined to think that the new genus is a too artificial construction. The edge in all the species is set with obtuse, hair-shaped or somewhat club-shaped cystidia, varying in width from 3—5—7 μ.

Except the outstanding *P. foenisecii* and *P. semilanceatus*, which grow in grass-fields, the Panæoli are more or less distinctly coprophilous. But some of the species are to be met with not only on dung but also on rubbish-heaps and the like, in humus rich in decomposing organic material.

The taxonomic arrangement which I think preferable will be seen in the Key.

KEY

TO THE SPECIES FIGURED.

A. Genuini. Spore-print almost black. Spores bistre, opaque, smooth.
- α. *Appendiculati.* Cap without a marginal darker belt. The edge of the cap overreaches the gills, often splitting up into appendicusale denticles.
  1. Cap campanulate-convex or semiglobate, whitish-pallid, smooth or cuticle cracking into irregular patches 1. *P. papilionaceus.*
  2. Cap campanulate or parabolic, tan to clay-coloured.
     - a. Cap everywhere minutely reticulate from raised ribs 2. *P. retirugis.*
     - b. Cap not reticulate, often irregularly cracked and becoming shining .... 3. *P. campanulatus.*
- β. *Nudi.* Cap with a more or less distinct marginal belt; no overreaching free edge.
  1. Cap narrowly parabolic, highth > breadth. Stem very slender and tense. Colours dark .... 4. *P. acuminatus.*
  2. Cap campanulate or almost expanded.
     - a. Cap fuligineous to nearly black, campanulate.... 5. *P. fimicola.*
     - b. Cap becoming expanded-umbonate, rather large and rubescent date-brown .... 6. *P. subbalteatus.*

B. Anomali. Spore-print fuscous. Individual spores pale brown, diaphanous.
- α. Cap acuminate, cucullate..................... 7. *P. semilanceatus.*
- β. Cap campanulate, expanding, obtuse, with marginal belt 8. *P. foenisecii.*

SYSTEMATIC AND FLORISTIC NOTES.

A. GENUINI

1. **P. papilionaceus** (Bull.).

Cap 2—3 cm., semiglobate or campanulate-convex, not hygrophanous, pale, whitish or dingy alutaceous, often cracking with age. Edge becoming appendiculate-dentate. Gills very broad and broadly adnate, almost horizontal or slightly ascendent. Stem comparatively short, whitish, 5—6 cm. × 2—4 mm., apex mealy.

Spores 13—17 × 8—10 μ, limoniform, smooth, sub micr. dark brown. Cystidia obtuse, hair-shaped to club-shaped.

Fig. spec. (D. A. pl. 700): (a whitish form) Hjallese, on manured ground in a grass-field, Oct. 1906. — Not uncommon, but not always typical.

Cooke's figure does not show the appendiculate edge and is uncommonly slender.

2. **P. retirugis** Fr.

Cap 2—2½ cm., campanulate, not hygrophanous, clay-brownish (with a slight flush of flesh-colour); wrinkled-reticulate all over, (except at the umbo) by raised ribs; edge appendiculate. Gills broad, ventricose, broadly adnate. Stem 8 cm. × 2½ mm, brownish, pale above, apex pruinose.

Spores limoniform, 14 × 9—9½ μ, impellucid, blackish. Cystidia obtuse, cylindric club-shaped, up to 7 μ broad.

Fig. spec. (D. A. pl. 701): Holmstrup, in a marshy meadow, (manured with horse-dung), June 1907. Not rare, but often less typical.

Cooke's figure (*Illustrations* pl. 627) is almost intermediate between the typical P. retirugis and P. campanulatus.

3. **P. campanulatus** (L.).

Cap parabolic, 1½—3 cm., edge appendiculate, the colour dirt-gray or somewhat fuscous (often becoming glossy with age), not hygrophanous. Gills lanceolate, ascendent. Stem stiff upright and tense, dirt-gray, pale above, somewhat incrassated upward, pruinose above, 6—9 cm. × 1½—3 mm.

Spores lemon-shaped, slightly dorsally compressed, 14—15 × 8—9 μ, opaque almost impellucid, blackish. Cystidia obtuse, coarsely hair-shaped, 4—5 μ broad.

Fig. spec. (D. A. pl. 702): Hunderup, pasture, Oct. 1896. Very common, often springing direct from the dung.

Cooke's figure (*Illustrations* pl. 629) is rufous-bay and rather dubious.

4. **P. acuminatus** (Schaeff.) Ricken (nec Fries).

Cap parabolic or almost conical, $1^1/_4$—2 cm., hygrophanous, soot-brown or bistre, drying paler brown or somewhat rufo-fuscous, with a broad, dark marginal belt when half-dry. Edge without appendiculation. Gills narrow lanceolate, ascending. Stem slender, straight and tense, comparatively tall (6—10 cm. × $1^1/_2$—2 mm.), slightly incrassated upward, bistre below, paler above, rufous inside.

Spores broadly limoniform, $11^1/_2$—14 × $8^1/_2$—$9^1/_2$ μ. Cystidia hair-shaped, about 3—4 μ broad at the apex.

Fig. spec. (D. A. pl. 703): Fruens Bøge, gregarious on a stack of decaying greensward-turf, in a wood, Aug. 1909. — Not uncommon in shady places in woods.

Ricken's description is excellent. Fries' diagnosis makes it evident that his plant cannot be identic: "Stipes albidus, deorsum fuscus. Pileo pro ratione major, carneo-alutaceus, margine primo crenulato" etc. — Cooke's figure of *P. caliginosus* may belong here, while his *P. acuminatus* answers fairly well to the Friesian diagnosis. Bresadola's *P. acuminatus* (*Iconographia* pl. 895) is indifferent.

5. **P. fimicola** Fr.

Cap $1^1/_2$—$2^1/_2$ cm. (exceptionally 3—6 cm.) semiglobate, indistinctly papillate, sepia, drying paler gray, with a dark marginal belt when half-dry. Gills very broad and broadly adnate, soon becoming black. Stem medium (7 cm. × $1^1/_2$—2 mm.), brownish-fuscous below, pale above, almost naked.

Spores lemon-shaped, slightly flattened from the ventral side 10—$13^1/_2$ × $8^1/_2$ μ, dark gray, slightly brownish, opaque. Cystidia somewhat bottle-shaped (up to 9 μ broad) or obtuse cylindric and slightly inflated below (some few vesiculose-obovate).

Fig. spec. (D. A. supl. after pl. 704): Husmandsskolen, on lawn, Oct. 1926. Not common, but found under varying conditions, mostly in grass in manured ground under trees.

Cooke's figure (*Illustr.* pl. 632 B) depicts a slender, pale, somewhat rufous, rather aberrant form. Bresadola's *P. acuminatus* may belong here (*Iconographia* pl. 895).

5a. **P. fimicola** var. *ater* J. E. Lange.

Smaller. Cap 1—$1^1/_2$ cm., almost black, drying dirty clay. Stem short, paler than the cap (3—4 cm. × $1^1/_2$ mm.); for the rest not materially different from the main form.

Spores $11^1/_2$—13 × 7—8 μ, limoniform, opaque. Cystidia obtuse, hair-shaped, short, about $4^1/_2$ μ broad.

Fig. spec. (D. A. pl. 705): Stenløse, gregarious in old grassfield under trees, May 1902.

6. **P. subbalteatus** Berk. & Br.

Cap $2^1/_2$—$4^1/_2$ cm., campanulate-convex, then expanded and somewhat umbonate, rufous-brown, drying clay with or without a rubescent tinge; marginal belt rather persistent. Edge without appendiculations. Gills moderately broad, lanceolate-ellipsoid, slightly adnate, somewhat flesh-coloured when young, becoming more brown with age and at last almost black. Stem rather stout, cylindric, comparatively tall (7—9 cm. × $2^1/_2$—4 mm.), pruinate above, pale clay-brownish rubescent, base mealy-tomentose. — Often subfasciculate.

Spores broadly limoniform, 12—13 × 9 μ, impellucid, blackish. Cystidia obtuse, hair-shaped club-shaped, 6—7 μ broad at apex.

Fig. spec. (D. A. pl. 704): Hjallese, gregarious in manured Asparagus-bed, June 1907. Not uncommon in manured places in open localities (roadsides, garden-beds etc.).

Ricken gives a very good description of this plant. But Cooke's figure (*Illustrations* pl. 631 B) is far too slender with a small, subfulvous-alutaceous cap.

B. ANOMALI.

7. **P. semilanceatus** (Fr.) Lange (*Psilocybe f.* Fries).

Cap conic-parabolic, cuspidate, 1—$1^3/_4$ cm. broad and high, clay to pale dirty ochre, smooth, somewhat viscid. Gills narrow lanceolate, ascending, becoming almost bistre, with a white edge, not distinctly variegated. Stem thin and slender, often wavy, 4—7 cm. × 1—2 mm., paler than the cap.

Spores ovate-sublimoniform, $11^1/_2$—$14^1/_2$ × $6^3/_4$—9 μ, rather light brown, somewhat pellucid. Cystidia small, acute, hairshaped-subulate, about 17 μ long.

Fig. spec. (D. A. pl. 688): Skørping, in grass, border of road, Sept. 1897. Rather common in similar localities.

8. **P. foenisecii** (Pers.) Schroet. (*Psilocybe f.* Fries).

Cap $1^1/_2$—$2^1/_2$ cm., campanulate to convex, obtuse, dull dusky brown, drying fuscous-clay or slightly rubescent. Marginal dark belt rather persistent; edge naked. Gills narrowed behind, motley when young and pale brownish, becoming fuscous-brownish, moderately distant. Stem paler than the cap, equal, naked, paler above, 5—7 cm. × 2—$2^1/_2$ mm.

Spores narrow limoniform, 12—15 × 7—$8^1/_2$ μ, somewhat rough, transparent, dull brownish. Cystidia short and obtuse, cylindric-hair-shaped, 35 × 5 μ, sometimes slightly inflated below.

Fig. spec. (D. A. pl. 706): Hjallese gregarious or solitary in grass, border of road, July 1897. Very common, especially from late in July to September.

The somewhat coloured stem and the limoniform spores distin-

guish this species from *Psathyra*. It is much smaller and more brittle than *P. subbalteatus*, and can always be recognized by the lighter brown, rough spores. But in many ways it is to intimately related to this species, that I prefer to place it in *Panæolus* rather than in *Psilocybe* or *Psathyra*.

Besides the above mentioned species some few others are on record from Denmark:

P. sphinctrinus Fr. — Specimens answering fairly well to the description of this species — but only differing from P. campanulatus in being somewhat smaller and more slender with an almost black or sepia-coloured cap — are occasionally met with in woodland, growing on dung in roads and sentries. The appendiculate edging is often very distinct. I regard it as a silvan form of P. campanulatus. *P. phalenarum* Fr. as mentioned by Sev. Petersen (loc. cit.) and depicted by Bresadola (*Iconographia* pl. 891) is evidently not specifically distinct from *P.* (*Stropharia*) *separatus*.

P. caliginosus (Jungh.) Fr. is also mentioned in Sev. Petersen's work as having been met with in Jylland. The species seems to me of very dubrious value (vide sub no. 4.).

P. fimiputris (Bull.) is very close to *P.* (*Stropharia*) *separatus*. Cooke's figure of *P. phalænarum* (loc. cit. pl. 626), which is said by Rea to belong to this species, does not differ materially from P. separatus. Cooke's figure (pl. 625) which he calls *P. fimiputris*, is rather different, but very dubious.

P. separatus (L.) is described in »*Studies*« V. sub nom. *Stropharia separata* (L.) Lange. Others have built up a new genus (*Annellaria*) on this species.

THE GENUS PSILOCYBE.

Psilocybe as delimitated by Fries is not a "natural", fairly homogeneous genus but rather a refuse-heap of species of various types which were difficult to locate in the adjacent genera. Several authors have attempted to clear up this tangle and distribute the different species in new genera (or the old ones), I myself have also tried my hand at this difficult task, but have given it up for the present: My knowledge of the numerous species is too limited to serve as a foundation for a new and elaborate construction.

I therefore will leave the Friesian genus almost intact. The only exceptions are 1) that I have transferred *Psilocybe foenisecii* Fr. to *Panæolus* (but this is in fact in accord with Fries' own opinion (vide *Hymenomycetes Eur.*, p. 303); 2) that — with SCHROETER (loc. cit.) — I refer *P. semilanceata* to *Panæolus*, with which it shares the larger spores and blackish sporepowder; and finally 3) that I transfer *P. coprophila* to *Stropharia*. Although its veil is rudimentary it affines so intimately with *Stropharia merdaria* — being in fact a reduced form of this species — that they should not be kept apart. And they both find a natural place in the vicinity of *Stropharia semiglobata*, while they have very little in common with the other species in the group *Deconica*, in which *P. coprophila* was placed by Fries. However, as they were not described under *Stropharia* in "*Studies*" V, I give a description here.

Psilocybe spadicea and its allies are very close to *Hypholoma*, especially *H. hydrophilum*, but they are absolutely devoid of a veil. *P. physaloides* runs into *Tubaria* (*Phaeoti*); while on the other hand some of the species which Fries placed in *Dermini*, e. g. *Naucoria myosotis*, are very close to *Psilocybe*.

I do not think it possible to write a clear and precise diagnosis of the genus Psilocybe; but the genus may roughly be characterised in the following terms:

Agarics with purplish black, bistre, subfuscous (or dusky flesh-coloured) spore-powder. Cap generally naked, with incurved edge, rarely with a rudimentary veil. Stem more or less cartilaginous. Gills not variegated, variously attached. Spores ellipsoid to ovate.

KEY

TO THE SPECIES FIGURED.

A. Deconica.

No veil. Gills rather broad, broadly adnate or subdecurrent.

α Stem subclavate, deeply rooting in the sand........ 1. *P. ammophila.*
β Not so. Spores small.
 a. Cap convex, umbonate, almost even .... 2. *P. physaloides.*
 b. Cap semiglobate, coarsely striate when wet......... 3. *P. atrorufa.*

B. Eu-Psilocybe.

Veil absent or rudimentary. Gills never plano-adnate or subdecurrent.

A. Solitares. Not fasciculate, growing on the ground, on moss or peat.
 α Spores large (over 12 μ long), subfusiform. Stem umber.... 4. *P. uda.*
 β Spores smaller, ovate or ellipsoid. Stem paler.
  a. Stem short. Cap somewhat fleshy, fulvous-tan, even 5. *P. dichroa.*
  b. Stem elongated. Cap submembranaceous, pale honey or with a tinge of olive, striate .... 6. *P. elongata.*

B. Fasciculares. More or less fasciculate, growing on or at the base of trees. Veil absolutely lacking.
 α Cap, gills and sporepowder with a flush of flesh-colour 7. *P. sarcocephala.*
 β Not so.
  a. Cap without striation, date-brownish when wet 8. *P. spadicea.*
  b. Cap minutely striate, watery pale when wet..... 9. *P. papyracea.*

Appendix: Stropharia.

Veil subannulate or reduced to appendiculate filaments. Spores somewhat limoniform, large (10 μ or more). Sporeprint purplish-black.

α Cap convex, subumbonate. Veil subannulate ... 1. *Stropharia merdaria.*
β Cap semiglobate. Veil rudimentary.
 a. Stem short .... 2. *S. coprophila.*
 b. Stem tall .... 3. *S.*(?) *sp.*

SPECIFIC DESCRIPTIONS AND NOTES.

A. DECONICA.

1. **P. ammophila** Dur. et Lév.

Cap $1^1/_4$—$2^1/_4$ cm., semiglobate to convex, pale dingy clay, rather fleshy, without striation. Gills horizontal, broad behind and plano-adnate, subfuscous or dark dirt-brown. Stem somewhat clavate, deeply (1—2 cm.) rooting in the sand, the particles of which adhere to the "root", thus making it appear club-shaped. Its total length is 4—5 cm., it is whitish above, but flushed with the colour of the cap below.

Spores ovate-oval, $11 \times 7\,\mu$, sub micr. somewhat yellowish-grayish brown. Cystidia vesiculose, obtuse or somewhat bottle-shaped.

Fig. spec. (D. A. pl. 696): Blaavands Huk, amongst Psamma in the outer sand-dunes, Aug. 1907. (Found rather commonly in similar localities by various mycologists).

The spore-powder is uncommonly pale for a Deconica, only slightly darker than in *Tubaria inquilina* or *Naucoria semiorbicularis*. Probably *Naucoria arenicola* Berk. (which is described from similar localities in South Africa) is identical.

2. **P. physaloides** (Bull.).

Cap 0.8—1.5 cm., convex, then expanded and somewhat papillate or umbonate, dull bay-brown, even; pale ochre-tan when dry. Gills rather broad, ventricose, adnate with a decurrent denticle, dark van Dyke-brown. Stem short, 2—3 cm. × 1 mm., paler than the cap, fibrillose, but soon naked, brown inside. No veil and no detachable viscid pellicle. Sporeprint fuscous with a tinge of purple.

Spores $6 \times 4\,\mu$, somewhat obliquely ovate, almost hyaline (slightly brownish-gray). Cystidia short, hairshaped-fusiform, about $22 \times 5\,\mu$.

Fig. spec. (D. A. pl. 699): Lundeborg, old grass-field (loamy soil), July 1914, gregarious.

Not common, but often numerous on rich, manured soil (edges of roads etc.).

It is not unlike *Tubaria inquilina*, but lacks the viscid, detachable pellicle and always grows on the ground.

Ricken accords somewhat larger spores (8—9×5—$6\,\mu$) to this species.

2 a. **P. physaloides** var. *substerilis*.

Cap honey-brown. Gills whitish-tan, almost devoid of spores.

This form is occasionally met with, especially late in the season.

3. **P. atrorufa** (Schaeff.).

Cap $^1/_2$—$1^1/_2$ cm., subglobate to convex, obtuse or indistinctly papillate, hygrophanous, rufous-bistre and striate half way up when wet, clay-brownish when dry. Gills very broad, horizontal, almost triangular, rufous soot-brown. Veil absent. Stem short, often wavy, $2^1/_2$—4 cm. × $^1/_2$—$1^1/_4$ mm., colour of the cap (paler above), brownish inside. Sporepowder bistre to fuliginous.

Spores broadly ovate, sublimoniform, 7 × $4^1/_2$—5 μ, pellucid, violaceous gray. Cystidia sparse, hairshaped.

Fig. spec. (D. A. pl. 697): Höbbet, on sandy soil (top of stone-hedge around young plantation), amongst Lichens etc., Nov. 1901. Common in similar localities.

Cooke's fig. (Illustrations tab. 511) does not belong here but may represent *P. foenisecii.*

(D. A. pl. 698 depicts a white-stemmed species of this group which I cannot identify. It grew solitary in sandy soil in a plantation, Skørping 1897).

B. EU-PSILOCYBE.

A. Solitares.

4. **P. uda** (Pers.).

Cap $1^1/_2$—$2^1/_2$ cm., convex or somewhat umbonate, without striation, dingy rufous, fulvous-tan when dry. Gills broad, narrowed behind and slightly adnate, pallid, then subfuscous with a tinge of purple. Stem wavy, van Dyke-brown, paler above, about 5 cm. × 2—$2^1/_2$ mm. Veil 0.

Spores very long ($12^1/_2$—20 × 6—8 (mostly 14—16 × $6^3/_4$) μ), ellipsoid-subfusiform. Cystidia obtuse, hairshaped, slightly inflated at the base, about 35 × 5—9 μ.

Fig. spec. (D. A. pl. 690 A): Skørping, in a peat-moss, mostly sprouting from the walls of the peat-diggings, Oct. 1898. — Not rare in similar localities.

4a. **P. uda** forma *sphagnicola.*

Taller. Stem slender (about 9 cm. × $1^1/_2$ mm.), base fibrillose. Cap somewhat conical, subpapillate. Spores etc. as in the main form.

Fig. spec. (D. A. pl. 690 B.): Holstenshus, "Sortsø", in Sphagnum, Aug. 1934.

Very distinct but hardly anything but a sphagnophilous form. Such a form is also mentioned by Fries (*Hymenomycetes Eur.*) but my specimens were fully fertile, not substerile, as Fries hat it.

The figure of P. uda in Cooke's *Illustrations* (569) represents *P. elongata* or an intermediate form.

5. **P. dichroa** Karst.

Cap 1—$2^1/_2$ cm., campanulate-convex, becoming subumbonate, even shining, fulvous-brown to datebrown when saturated, becoming

pale tan when dry (from centre out). Gills very broad, strongly emarginate, adnate, pallid at first, then dark fuscous (edge whitish), somewhat distant. Edge of cap incurved over the gills, at first showing rudiments of a whitish, fibrillose veil. Stem 3—5 cm. × $1^1/_2$ —3 mm., whitish at first, becoming somewhat ferruginous inside, slightly silky-fibrillose. Sporepowder brownish-fuscous.

Spores $8^1/_2$—10 × $4^1/_2$—5 μ, ovate ellipsoid, sub micr. pale brown. Cystidia short hair-shaped, obtuse, base slightly thicker (5 μ), 30—35 μ long.

Fig. spec. (D. A. pl. 689): Hjallese, growning on peaty ground (side-walls of peat diggings), solitary (or subfasciculate), Sept. 1913.

5b. **P. dichroa** forma.

This form differs but slightly from no. 8a. It has a more distinctly umbonate cap, a still more rudimentary veil and the spores are slightly smaller ($8^1/_2$ × $4^3/_4$ μ). Fig. spec. (D. A. suppl. after 689). Borris in a meadow near Skern Aa, gregarious, Sept. 1919. — Also met with at Elsehoved, Oct. 1920, in wet, partly submerged meadow-land, on boggy ground with rhizomes of Scirpus etc.

I refer these finds to P. dichroa in the sense of Karsten, who gives a very good description of it in *Kritisk Öfversigt af Finlands basidsvampar*. The figures of *P. subericæa* in Fries' *Icones selectæ* are not unlike my plant, but P. subericæa is said to grow "in campis sterilibus". — It forms a transition to *Hypholoma* (subg. *Næmatoloma*).

6. **P. elongata** (Pers.).

Cap 1—2 cm., campanulate-convex to almost flat, watery pale, honey-yellow or slightly olive-greenish, pellucido-striate, submembranaceous. Edge with an effugient, rudimentary, fibrillose veil. Gills pallid, then nebulose-fuscescent, rather broad, emarginate-adnate, rather distant. Stem elongated, slender (6—10 cm. × $1^1/_2$—2 mm.), whitish above, subfulvous below, attached in almost its entire length to the Sphagnum- in which it grows.

Spores ovate, $9^1/_2$—11 × $5^1/_2$ μ. Cystidia somewhat bottle-shaped fusiform, about 13 μ broad.

Fig. spec. (D. A. pl. 691): Holstenshus, Sortsö, in tufts of Sphagnum, Oct. 1898. Common everywhere in tufts of Sphagnum and the larger Polytricha.

Fries referred *P. elongata* as well as *P. polytrichi* (two forms which run into each other and hardly are worth keeping apart) to *P. uda*, as subspecies. The totally different spores show that this is erroneous. I therefore keep it apart and use the name *elongata* — as the more appropriate name — for both forms. — Substerile forms are rather common; their pale gills may lead the student to refer them to Naucoria. It is not impossible that some of the forms described sub nom. *Naucoria scorpioides* (a much disputed species) belong here. — Ricken refers *P. polytrichi* to *Hypholoma*.

But what he calls *P. elongata* cannot possibly belong here. It probably is a form of *Hypholoma dispersum.*

B. Fasciculares.

7. **P. sarcocephala** (Fr.?) sensu Konr. et Maub.

Cap 3—4 (6) cm. broad, convex or somewhat umbonate, rather firm, at first pale flesh-colourdate-brownish, but soon fading to whitish, opaque. Gills rather narrow, almost free, moderately crowded, dingy pale flesh-colour, then darker brown flesh-colour. Stem whitish, stout, cylindric or slightly ventricose (5—6 (7) cm. × 5 (8—10) mm., slightly fibrillose, apex faintly white-plumulose, veil absent. Sporepowder dusky trout-red. Smell rather strong.

Spores ovate, $9 \times 5^1/_2\,\mu$, pale brownish flesh-colour. Cystidia large, inflated, 14—17 μ broad, those on the face of the gills and some of those on the edge somewhat bottle-shaped with an obtuse neck, the apex of which is crested with crystalloid bodies.

Fig. spec. (D. A. suppl. after pl. 686): Odense, fasciculate at the base of Ulmus (and other trees), on the ground, Sept. 1916 (and Sept. 1935, same spot). Rather rare.

Fries figures (*Icon. sel.*) depict a gigantic form and a very pale, slender one. He describes it as growing "in graminosis" and places it far from *P. spadicea*, so that it is somewhat doubtful whether it is the P. sarcocephala, as now understood.

Konrad & Maublanc give a very good description and figure of it. Ricken regards it as a mere form of *P. spadicea.* The best mark of distinction is the flesh-coloured sporeprint.

8. **P. spadicea** (Schaeff.).

Cap 3—6 cm., convex, expanded, somewhat fleshy, watery pale date-brown or dark livid horn-brown, alutaceous white when dry, without any striation and absolutely devoid of a marginal veil. Gills at first pallid (with a flush of flesh-colour), then dusky brown, ventricose, adfixed. Stem cylindric, white, 4—6 cm. × 4—7 mm., rather firm. Densely fasciculate.

Spores oval or sub-phaseoliform, $8^1/_2$—10×4—$5\,\mu$. Cystidia vesiculose, up to $50 \times 16\,\mu$, sometimes bottle-shaped with a shorter or longer neck, the rather acute apex of which is sometimes slightly crested by crystalloid bodies.

Fig. spec. (D. A. pl. 686): Hunderup, at base of Populus tremula May 1899 (it reappeared regularly, for some years, twice annually (May and September). Rather rare.

This species (which is very close to no. 7) has a certain likeness to *Hypholoma hydrophilum* but is much firmer, without striation and absolutely devoid of a veil. The spores are twice as large. — Konrad & Maublanc have a very good figure of it.

9. **P. papyracea** (Bolt.).

Cap campanulate-convex, 2—4 cm. broad, watery fuscous-pallid, edge minutely striate, becoming almost white when dry. Gills ventricose, somewhat fleshcoloured, becoming dark rufous-bistre with a flush of purplish. Stem rather short, often curved, about 4 cm. × 4 mm., white. Sporepowder fuscous. Growing in small fascicles.

Spores oval, 7—8 × 4 μ. Cystidia somewhat inflated, with or without a bottleneck-like apex, 8—11 μ broad.

Fig. spec. (D. A. pl. 687): Hjallese, in the head of a pollarded Populus, Oct. 1908. Not uncommon, chiefly on poplars.

The three last species are very intimately connected.

Besides the species mentioned above, some few others are on record from Denmark. Sev. Petersen's find of *P. pertinax* I am inclined to refer to *Hypholoma* (*H. instratum-chondrodermum*). *P. tegularis* (Schum.) is a species of very problematic value which has not been met with for the last 100 years. *P. cernua* is also a very dubious species. Finally Sev. Petersen describes a species sub nom. *P. murcida* Fr., which, however, I am inclined to regard as a *Psathyra*, especially on account of its large spores.

Appendix: **Stropharia.**

(For the non-psilocyboid *Stropharias* vide „*Studies*", part V.)

1. **S. merdaria** Fr. (*Psilocybe merdaria* Rick.).

Cap $1^1/_2$—4 cm., convex, subumbonate, pale tan (somewhat dusky when wet, rather fleshy with a viscid pellicle, without striation, edge set with fugacious white remnants of the veil. Gills very broad, horizontal, decurrent with a line on the stem, at first pale (with a slight flush of straw-yellow), then dusky chocolate. Stem more or less rooting in the substrate, 3—5 cm. × 2—4 mm., rather tough, white-flocculose, with a ring-like zone (especially in vigorous specimens), becoming brownish inside from base up. Sporeprint sepia-bistre.

Spores ovate-limoniform, 12 × $7^1/_2$ μ, somewhat diaphanous, violet-fuscous. Cystidia short, hairshaped.

Fig. spec. (D. A. pl. 692): Hjallese, gregarious or subfusciculate on mud from sewer in garden-beds, June 1913. Not uncommon in similiar localities, on heavily manured ground.

2. **S. coprophila** (Bull.) Lange. (*Psilocybe c.* Fries).

Cap 1—2 cm., semiglobate, without striation, paler or brighter tan with a flush of fulvous in the middle, edge very sparingly set with white flocci. Pellicle viscid. Gills triangular, plano-adnate, becoming purplish fuscous-bistre. Stem 3—4 cm. × 1—2 mm.,

dusky brownish, pallid above, floccoso-fibrillose. Sporeprint purplish fuliginous.

Spores ellipsoid-sublimoniform, 13—14 × $7^1/_2$—8 μ. Cystidia subulate-hairshaped, somewhat inflated below, 35 × 8 μ.

Fig. spec. (D. A. pl. 693): Sanderum, on horse-droppings, swampy common, Aug. 1909.

2 a. **S. c.** formæ *etiolata* and *subetiolata.*

The totally etiolated form had a very long, meandering, whitish stem and a very small (0.5—0.7 cm. broad) but fertile cap, with spores a little smaller (mostly 10 × 6 μ) than the subetiolated form in which they were 12—13 × $6^1/_2$—7 μ.

Fig. spec. (D. A. pl. 694 A. and B.): Hjallese, growing in great numbers on the residue in blocked-up drain-pipes from a kitchen-drain, in absolute darkness (A) or in very deep shade (B), Oct. 1897.

2 b. **S. c.** var (?).

Cap about 2 cm., brownish tan. Stem short (about 3 cm.), rather stouts, brown inside, dirt brownish outside, for the rest, macroscopically as well as microscopically like no. 2.

Fig. spec. (D. A. pl. 695): Pederstrup, edge of road (grass outwashed horse-dung), Oct. 1904. —

I formerly referred this find to *P. bullacea.* But P. bullacea (in the sense of Ricken) is a coarsely striate species with small spores. — My plant is hardly anything but a dusky form of *P. coprophila.*

3. **S.** (?) sp. (*Psilocybe ericæa* forma?).

Cap $1^1/_2$—$2^1/_2$ cm., convex, umbonate, striate $^1/_3$ in, when wet, dark brownish-fuscous olive, edge paler, without any trace of a veil, with a detachable viscid pellicle (dirty tan-whitish when dry). Gills broad, horizontal, broadly adnate with a decurrent tooth, original colour pale grayish, becoming dark gray with a flush of violaceous. Stem tall (6 cm.) and slender (2—3 mm.), brownish yellow inside, dirt-brownish outside, pallid straw-yellowish above, hollow, glabrous and shining. Spore-print brownish-black with a flush of violaceous.

Spores oval-limoniform, 10—12 × 6—$6^3/_4$ μ, pellucid, fuscous with a flush of violaceous. Cystidia small, crowded, hair-shaped, about 4 μ broad below, 25 μ long.

Fig. spec. (D. A. suppl. after pl. 689): Aaløkkeskov, on marshy ground, bottom of dried up pond, under Fraxinus etc., Sept. 1923.

This form is evidently related to *P. coprophila*, but differing in colours and stature. Fries' picture in *Icones sel.* t. 136 of *P. ericæa* (the smallest specimens) is not unlike my plant, except for the emarginate gills. (For this dark form of P. ericæa Fries cites *Ag. dicrous s. nitidus* Pers. as a synonym). — It should be further studied before having any name attached to it.

THE GENUS GOMPHIDIUS.

Gomphidius is a very distinct genus, which stands in a rather isolated position within the Agaricaceæ. By the form of its spores it affines to Boletus (with some species within this genus it also shares the viscid universal veil). It also shows some affinity to Limacium, from which it is distinguished by the long, coloured spores. The only other Agaric which shows any real affinity to Gomphidius seems to be the rare species *Melanomphalia nigrescens* which might be placed next to the *Gomphidii.* (The spores are very similar, but it has no trace of a veil and is much smaller than the smallest species of Gomphidius).

The genus may be briefly defined as follows:

Fleshy species with a viscid cap, decurrent, rather thick gills with large, elongated-fusoid, dark spores. Spore-powder almost black. A viscid or fibrillose universal veil extends from the peronate stem to the edge of the cap.

KEY

TO THE SPECIES FIGURED.

α. Base of stem chrome-yellow inside. Whole plant paler or darker gray.
- 1. Cap 4—9 cm., very fleshy. Stem stoutish........... 1. *G. glutinosus.*
- 2. Cap about 4 cm., slightly fleshy. Stem slender....... 2. *G. gracilis.*

β. Base of stem inside pinkish or rubiginose-yellow; Colour not gray.
- 1. Cap rosy. Gills smoky gray .... 3. *G. roseus.*
- 2. Cap some shade of brown. Gills somewhat purplish or vinaceous brown .... 4. *G. viscidus.*

SPECIFIC DESCRIPTIONS AND NOTES.

1. **G. glutinosus** (L.).

Cap 4—9 cm., convex, some shade of gray or fuscous, glutinous. Flesh thick. Gills grayish, blackening. Stem rather short, 5 cm. ×

$1^1/_4$—$1^3/_4$ cm., colour of the cap, base acuminate, chrome-yellow inside.

Spores elongated-fusiform or almost cylindric, 18—22 × 5 μ. Cystidia dispersed, cylindric, very large. Basidia 4-spored.

Fig. spec. (D. A. pl. 770): Gribskov, wood of Picea, Sept. 1896. Rather common, in woods of Picea.

Cooke's illustration (pl. 879) is too lively coloured (brownish flesh-colour).

2. **G. gracilis** Berk. (*G. maculatus* (Scop.) var. *gracilis* Konrad). Cap 3—4 cm., expanded, at last slightly depressed around the little dark umbo. Colour pale fuscous or alutaceous fuscous Flesh thin. Gills smoky gray. Stem slender (5 cm. × 6 mm.), whitish, gradually becoming black from base upward, fibrillose reticulate, its flesh whitish above, becoming subfuscous rubescent towards the acuminate base, where it is chrome-yellow.

Spores elongated fusiform or almost cylindrical, 18 × $5^1/_2$ μ, pellucid, pale brownish-fuscous. Cystidia inflated-cylindrical, their free portion 60—75 μ long.

Fig. spec. (D. A. suppl. after pl. 773): Holstenshus (Gerup Skov) in grass, outskirts of plantation of Abies with some few old Larix, Aug. 1933, some few specimens. — Said to be constantly lariciphilous.

This rare species is probably identic to *G. nigrescens* Peck. — Cooke's illustration of *G. maculatus* (*Illustrations* pl. 882) must be something else, as the base of the stem lacks the yellow flesh. Cooke's *G. gracilis* is figured somewhat paler and not blackening, but probably is identical all the same (*Illustrations* pl. 883).

3. **G. roseus** (Fr.) Quél.

Cap 3—5 cm. ,convex, at last depressed, pink. Gills at first pallid, then smoky gray. Stem white, base inside and outside dingy pinkish, fibrillose-squamulose above, somewhat attenuated downward, 4—5 cm. × 0.6—1.3 cm. Veil somewhat fibrillose.

Spores of the usual shape, 17—21 × 5—$5^1/_2$ μ.

Fig. spec. (D. A. pl. 771): Haare Bjerge, amongst Sarothamnus under Pinus silvestris in the outskirts of a coniferous wood, Oct. 1907. Rather rare, always under Pinus.

It is rather strange that Fries regards this nice little species as a variety of *P. glutinosus* with which its has nothing to do. He also says about it that it is to be met together with *G. glutinosus*, which however, will rarely be tbe case (at least in Denmark), as it is strictly pinophilous, white *G. glutinosus* grows under Picea.

4. **G. viscidus** (L.).

Cap 4—7 cm. or more, convex with a more or less acute umbo, some shade of tan-colour while in bud, but soon becoming vina-

ceous rubescent or fuscescent. Gills broad, at first pale brownish, soon becoming vinaceous fuscous. Stem slender or stout, 6—7—8 cm. × 5—18 mm., more or less rufescent tan, squamulose above. Flesh of cap rubescent tan, rhubarb-yellow at the base. Spore-powder dark olive-fuscous.

Spores slightly broader, more fusiform than in the other species, 18—24 × 6—7 μ, hyaline to pale brownish. Cystidia on edge of gills sparse, large, total length about 100 μ.

Fig. spec. (D. A. pl. 772): Haare Bjærge, wood of Pinus, Oct. 1907. *G. v.* forma *gigantea* (Fig. spec. D. A. 773) collected at Langesø, in wood of Pinus and Fagus. — Rather common, but strictly limited to woods of Pinus.

THE GENUS PHYLLOPORUS.

A somewhat Boletoid genus (up to the present only comprising a single species), characterised by having a fleshy cap, subdecurrent, detachable yellow gills which are connected by transversal veins and occasionally form elongated pores. The spores are yellow, subfusoid-elongated (Boletiform); the sporeprint is subferruginous.

1. **P. paradoxus** (Kalchbr.).

Cap about 6 cm., convex with somewhat undulate edge; surface tomentose or almost velutinous, crimson-brown, paler and slightly yellowish towards the edge. Gills rather thick, yellow, rufescent when touched, deeply decurrent on the about 4 cm. long, subsquamulose stem, which is attenuated downward and paler than the cap.

Spores subfusoid-elongated, 11—13 × 4—5 μ, pale yellow.

Fig. spec. (D. A. pl. 958): "Egeskov", in moss, outskirts of plantation of Picea in wood of Fagus (solitary old specimen), Sept. 1912.

This peculiar species, which macroscopically as well as microscopically has much in common with *Boletus chrysenteron*, seems to be very rare but to have a wide distribution. It is the bearer of a host of names: *Flammula paradoxa*, *Paxillus p.*, *Phylloporus Pelletieri* and *P. rhodoxanthus.* According to Bresadola *Flammula Tammii* Fr. is identic. — The only Agaric which shows some affinity to this peculiar species is *Cortinarius heterosporus* Bres.

THE GENUS CANTHARELLUS.

Cantharellus as here conceived (i. e. in the Friesian sense) is a somewhat heterogeneous genus, even if only the species described in this paper are taken into account. At one side are to be found the extreme Clitocyboid species with thin gills which only deviate from the common Agaricus-type by being repeatedly forked. At the other extreme we have the Craterelloid species, in which the gills are reduced to obtuse, irregularly dichotomous ribs, rarely more than 1 mm. wide. Between these extremes — but closest to the latter — stand such species as *C. cibarius*. Several modern authors prefer to remove the Clitocyboid species to *Clitocybe*, but I retain them in *Cantharellus* in order not to interfere more than strictly necessary with the Friesian taxonomy.

The spores in Cantharellus are always white, but vary considerably in shape. The basidia in most species seem to be four-spored, but in some few cases 5—6-spored basidia are met with. — The resupinate, membranaceous species (*retirugis*, *lobatus*, etc.) which Karsten has united in a new genus *Leptotus* (*Dictyolus* Quél.), fall without the scope of these studies.

KEY

TO THE SPECIES FIGURED.

A. Clitocyboidea. Gills thin, Clitocyboid, repeatedly dichotomous, crowded.

- *α*. Cap gray, somewhat tomentose. Gills pure white ... 1. *C. umbonatus*.
- *β*. Cap orange (rarely pale cream). Gills of the same colour as the cap.
  - 1. Cap orange .... 2. *C. aurantiacus*.
  - 2. Cap cream .... 2a. *C. a.* var. *pallida*.

B. Craterelloidea. Gills thick, irregularly dichotomous, obtuse, distant.

- *α*. Stem and cap fleshy and firm.

1. Whole plant egg-yellow .... 3. *C. cibarius.*
2. Whole plant dusky violet (vide *Craterellus clavatus*).

β. Cap thin. Stem somewhat cartilaginous.
1. Stem yellow to fulvous.
   a. Stem yellow. Gills becoming pale grayish-pruinate 4. *C. infundibuliformis.*
   b. Stem and gills pale fulvous. Gills not pruinate 5. *C. tubæformis* var. *lutescens.*
2. Whole plant gray.
   a. Cap infundibuliform, irregularly lobed. Stem short, sulcate, often pervious .... 6. *C. cinereus.*
   b. Stem cylindric, slender, not hollow.
      * Cap convex, $1^1/_2$—2 cm. Gills moderately broad 7. *C. replexus.*
      ** Cap subinfundibuliform. Gills very narrow, strongly decurrent .... 8. *C. cupulatus.*

SPECIFIC DESCRIPTIONS AND NOTES.

1. **C. umbonatus** (Quél.).

Cap 3—4 cm., somewhat infundibuliform with a small central papilla, blackish gray, edge paler, surface tomentoso-flocculose. Gills narrow, crowded, repeatedly dichotomous, decurrent. Stem rather slender, pale gray, base slightly thicker (4—7 cm. × 3—6 mm).

Spores subfusiform-elongated, 10—11 × $2^3/_4$—$3^1/_4$ μ. Basidia 4-spored.

Fig. spec. (D. A. pl. 952): Kirkeby, growing in deep moss amongst Calluna in wood of Picea, Oct. 1908. Not uncommon, in similar localities.

2. **C. aurantiacus** (Wulf.).

Cap 3—5 cm., plano-convex or slightly depressed, of a paler or deeper orange (paler at the margin, centre sometimes subfulvous), somewhat tomentose. Flesh submembranaceous, soft. Gills narrow, crowded, repeatedly dichotomous, bright and deep orange (rarely pale). Stem rather short, often curved, 3—4 cm. × 4—7 mm., somewhat paler than the cap.

Spores roundish-ovate, $5^1/_2$—6 × 4 μ. Cystidia absent. Basidia 4-spored.

Fig. spec. (D. A. pl. 951): Haare Bjerge, open space in wood of Picea, Oct. 1907. Very common in coniferous woods, chiefly in clearings and open spaces.

Pallid forms, with an almost whitish or pale tan cap are occasionally met with. It is more rare to find specimens in which the orange colour is also absent in the gills. Such a one is:

2a. **C. a.** forma *pallida* Cooke.

Cap 3—4 cm., pale yellow-ochre (disc slightly orange). Gills cream-white. Stem short, somewhat dirt-brownish below, pale above.

Fig. spec. (D. A. suppl. after 951): "Jenle" in Salling, gregarious in grass in meadow-land with solitary trees (Picea), Sept. 1932.

3. **C. cibarius** Fr.

Cap 4—8 cm., fleshy and firm, turbinate or irregularly plano-infundibuliform, edge wavy or lobed. Colour of the entire plant egg-yellow to pale tan (rarely almost cream). Gills narrow, deeply decurrent, irregularly dichotomous, often crispate, edge obtuse. Stem stout, often rather short 2—6 × 1—2 cm., fleshy.

Spores oval, $8 \times 4^1/_2\ \mu$. Cystidia absent. Basidia 4-spored.

Fig. spec. (D. A. pl. 953): "Gröften" near Glamsbjerg, in wood of Fagus, Aug. 1909. Very common in woods of Quercus and Fagus, mostly on hill-slopes, gregarious.

4. **C. infundibuliformis** (Scop.).

Cap 2—6 cm., irregularly infundibuliform (sometimes pervious with age) with a lobed-crispate, incurved or upturned edge; surface pale ochre-brownish, sparingly set with innate, small squamules or fibrils, often rugulose or veined. Gills strongly decurrent, forming irregularly branched low ridges which are pallid tan, but covered entirely by a pale, almost whitish-gray pruina. Stem rather tall and tense, wavy, generally sulcate or compressed, deep yellow, 4—6 cm. × 0.4—1 cm.

Spores subspheric, $9—9^1/_2 \times 7^1/_2—8\ \mu$. Basidia with 4 or 5 sterigmata.

Fig. spec. (D. A. pl. 954): Søby Søgaard, gregarious amongst grass in young plantation of Abies. Fairly common.

Of this species small reduced specimens are often met with, especially on and around decaying stumps, in moss.

5. **C. tubæformis** Fr. var. *lutescens* (Bull.).

Cap $2—3^1/_2$ cm., plano-convex, somewhat umbilicate, when fresh of a somewhat bay date-brown colour with an even surface, when dry expallent and more yellowish, slightly veined-fibrous. Flesh pale yellowish. Gills somewhat crowded, about 0.8 mm. broad and 0.3 mm. thick, forked (but rarely more than once), without grayish pruina, yellowish fulvous or more yellow, somewhat decurrent, arcuate. Stem cylindric or somewhat compressed, slightly hollow above, of a deep yellow colour with a flush of fulvous.

Spores (in my specimens) rather sparse, spheric-ovate, $9—9^1/_2 \times 7^1/_2—7^3/_4\ \mu$. Some of the basidia only with two sterigmata.

Fig. spec. (D. A. suppl. after pl. 954): Løverodde, in humus mixed with chips, in mixed wood, a number of specimens, Aug. 1933. Also met with at Langesø, in mixed wood, Oct. 1936.

This species is rather distinct in habit; but it is not impossible that it should be regarded as a form of no. 4. The typical *C. tubæformis* is not clear to me. As described by Fries and Ricken it is not materially different from var. *lutescens*; but Rea accords "pruinose grayish" gills to it, although Fries expressly states that they are „nudis". *Cantharellus lutescens* (Pers.), which Fries places in *Craterellus*, I have never met. It is characterised by a strong odour and venose, not much raised ribs.

It is figured and described by Konrad & Maublanc (loc. cit p. 493) as a plant very much like my var. *lutescens* (Bull.); and they also say that the ribs are naked (while Ricken calls them pruinose). The two may be identical, although my plant has lamelloid ribs and no pronounced odour. The figure (pl. 500) by the same authors of *C. tubæformis* var. *lutescens* (Bull.) is an entirely different species from mine.

6. **C. cinereus** (Pers.) (*C. Hydrolips* Bull.).

Cap 3—6 cm., deeply infundibuliform, often pervious half way down, very irregular, lobed and crispate, pale fuscous with veins, squamules and depressions of a darker fuliginous colour; pale ashy when dry. Gills irregularly branched and forked, rather riblike, distant. Stem attenuated downward, lacunose or deeply grooved, gray inside and outside.

Spores ovate-oval, $8 \times 5\ \mu$. Basidia with 6, 5 or rarely 4 sterigmata.

Fig. spec. (D. A. pl. 955): Hjallese, gregarious in wood of Fagus, Aug. 1897. Not common.

This species forms a transition to *Craterellus*.

7. **C. replexus** Fr.

Cap $1^1/_4$—$1^3/_4$ cm., campanulate-convex, subfuscous, whitish-gray when older. Gills rather broad (2 mm.), adnato-decurrent, distant, pallid dirt-gray, irregularly branched. Stem 3—4 cm. × 2—3 mm., not hollow, dirtgray, whitish above, somewhat wavy. Flesh pale fuscous, becoming whitish.

Spores subspheric, $7^1/_2$—$9 \times 6^1/_2$—$7^1/_2\ \mu$, with a big central drop. Basidia 4-spored.

Fig. spec. (D. A. pl. 956): Vissenbjerg, on the ground amongst needles, wood of Picea, Sept. 1908. (Some few specimens).

8. **C. cupulatus** Fr.

Cap 0.6—0.9 cm., plano-infundibuliform, dirtbrown, indistinctly striate when wet, somewhat rugoso-tomentose when dry. Gills of the same colour, narrow ($^1/_3$ mm.), irregularly branched, strongly decurrent into the 3 cm. high, $1^1/_2$ mm. thick, pallid stem, which is without any cavity.

Spores $7^1/_2 \times 5\ \mu$, ovate-ellipsoid. Basidia 4-spored.

Fig. spec. (D. A. pl. 957): Silkeborg, on sandy soil amongst Lichens in a young plantation, Oct. 1914.

This tiny little species looks like a small *Omphalia* but is well characterised by the irregularly branched, thick, almost rib-like gills.

Sev. Petersen (loc. cit.) also mentiones *C. albidus* Fr. This is a very small species which according to Ricken can be distinguished from albinos of *C. aurantiacus* by somewhat smaller spores (4—5 × 3 μ). According to Schumacher it grows in woods of Fagus; but Sev. Petersen has it from a coniferous plantation. *Craterellus clavatus* (Pers.) which some authors refer to *Cantharellus* with which it certainly has much in common, is rare in Denmark (I have only met it once, at Langesø, on sloping ground near the lake). It is a large species, easily relognized by its turbinate shape and lilaceons colours.

THE GENUS SCHIZOPHYLLUM.

The only species of this genus which grows in Europe is *S. commune*. It seems to be a true cosmopolitan, but is rare in Denmark. The dominant characteristic of the genus is the way in which the gills split longitudinally, from the edge in, revolving so as to cover the smaller, secondary gills.

1. **S. commune** Fr. (*Agaricus alneus* L.).

Cap $^1/_2$—3 cm., reniform or semicircular, edge often irregularly lobed and crispate. Surface ashy gray or somewhat lilaceous, piloso-tomentose, paler when dry. When old it becomes grooved at the edge (especially the larger specimens) and concentrically belted. The gills radiate from the base (or a very excentric points); they are dirty grayish lilac, splitting and recurved. The stem is very short or more often totally lacking. The thin flesh is tough and dry.

Spores almost cylindric, slightly curved, with an oblique pedicel, $5^1/_2$—$6 \times 7^3/_4\ \mu$, hyaline.

Fig. spec. (D. A. suppl. after pl. 957): Dyrehaven, on branches and felled trunks of Fagus, Oct. 1932 (Leg. Björnekjær). Rare. (I have never met with it in Fyn (during more than 40 years); but in recent years it has been collected in several localities near Copenhagen, rather numerous). It grows on the not yet decaying bark. —

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